ON THE NEW GENUS *AUSTROGYNACANTHA* [NEUROPTERA: *Odonata*] WITH DESCRIPTION OF SPECIES.

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(Plate v.)

In his unpublished MSS.* de Selys has described a new species *Gynacantha heterogena* from a unique female in his collection. This interesting species has ever since remained known to odonatologists by this unique example only. Two years ago M. René Martin sent me the description and locality—Rockhampton, Queensland—and I was hopeful that I might be fortunate enough to discover the male. While examining and naming the fairly extensive collection of Odonata in the Macleay Museum, Sydney University—most of which are Queensland insects taken by Sir William Macleay's collectors—I found two males of a species which evidently coincided with *G. heterogena*. One of these was presented to me in exchange by Mr. Masters, the Curator of the Museum; and as it is from Rockhampton, the same locality as the unique female of de Selys, I have founded my description on it and made it the type-male. This year, during my visit to Cooktown, I searched carefully for it and for other species of *Gynacantha*, but the continuous heavy rains

* The species is not recorded in the Zoological Record, which I have carefully searched through twice from 1866 to present date. It is not recorded in Kirby's 'Catalogue of the Odonata,' but it is given by M. René Martin, without description, in his 'Odonates du Continent Australien 1902.' I have therefore concluded that the description was known to M. Martin but not to the world, and is probably one of de Selys' numerous unpublished MSS. species.

made it impossible to obtain any *Aeschnidæ* worth mentioning. A week after I left, however, my friend Mr. Olive found this species by no means uncommon there, and he has since then forwarded me six males and six females. These, in spite of considerable damage in transit by post, afford me sufficient material for the present paper. Doubtless de Selys felt, when describing the female, that its smaller size and very different markings and colouration might warrant the formation of a new genus to contain it; at least the name *heterogena* irresistibly suggests the impression it made upon his mind. But it was not de Selys' way to propose a new genus for a unique female, which possessed all the more essential characters of the genus *Gynacantha* as defined by Rambur. Later on Förster,* in instituting the new genus *Karschia* for the reception of his species *Gynacantha cornuta* and *G. angulata, of which the females alone were known*, seems to have set a precedent which it would not be wise to follow. It is at least evident that the characteristics of his genus are incomplete, and must necessarily suffer alterations and additions when the males of his species are discovered. It is also evident that when he speculates as to the probable number of cells in the anal triangle of the hindwing of the *unknown* male, he is not dealing with facts at all, and such speculations should be rigidly kept out of his generic definition. With the male of *G. heterogena* before me, I can go so far as to say that no odonatologist could possibly have predicted the extraordinary form of its anal angle, either by examination of the corresponding cells of the female, or by drawing on his imagination. Even with the added knowledge of the group that this remarkable insect has given me, I am not at all prepared to say what the males of *Karschia cornuta* and *angulata* will be like. They might possess either a two-, three-, or four-celled anal triangle, and it may be either sharply angulated, as in the true species of *Gynacantha*, or of the peculiar rounded form found in

* Odonaten aus Neu-Guinea, von F. Förster in Bretten, ii.; Természetrajzi Füzetek, xxiii. Köt. 1900 ("Bemerkungen zur Gattung *Gynacantha* Ramb.").

G. heterogena. Though the two species of *Karschia* are of smaller size than the true species of *Gynacantha*, yet *G. heterogena* again is smaller still. And though *Karschia* exhibits several important differences from the true species of *Gynacantha*, yet *G. heterogena* (female) again exhibits important differences from *Karschia*. Hence I will not attempt to rope in the females of *Karschia* with *heterogena*, whilst, on the other hand, it is impossible to ignore the striking characters of the male of *heterogena* and attempt to place it, by female characters only, under the genus *Karschia*.

I propose to found a new genus *Austrogynacantha* for the reception of the beautiful and remarkable species *Gynacantha heterogena*.

AUSTROGYNACANTHA, n.g.

Type *Gynacantha heterogena*.

Characters as in *Gynacantha* Rambur, viz., "Face narrow, eyes large, touching for a long space, slightly sinuous behind, occiput very small. Second segment of abdomen in male having a pronounced tubercle. Appendages of male simple, slender; last segment in female jutting out and prolonged below, furnished with long spines [two or three only in the species which I know]; membranule nearly nil,"* but with the following important exceptions and differences, shown best by a comparative enumeration.

GYNACANTHA (s.str.)[*G. Rosenberghi*† Selys].—(1) Large insects, expanse of wings in ♂ 90 mm. at least. (2) *Abdomen of both sexes sharply constricted at segment* 3. (3) Spurs of segment 2 in ♂ very conspicuous, *rounded*. (4) Hindwings very broad. (5) *Anal margin of hindwing of* ♂ *strongly angulated*; the outer side of the anal triangle composed of a very strong and thick vein, much stouter than the continuation of the postcostal margin; anal angle *conspicuously angulated*. (6) *Anal triangle of hind-*

* Rambur, Neuroptères, p.209, 1842.

† I have chosen this species as being one that is both well known to me and very typical of the genus.

wing of ♂ rather short, broad, three-celled. (7) Triangles of fore- and hind-wings of equal length, 6-7 celled, and practically similar. (8) Nodal sector, just below the pterostigma, takes an abrupt and conspicuous bend, and then runs straight to the margin of the wing. (9) Arculus at least 2 mm. from the inner angle of the triangle; *at least one* hypertrigonal cross-vein interposing.

AUSTROGYNACANTHA [*G. heterogena*]. — (1) Size moderate, expanse of wings in ♂ about 80 mm. (2) *Abdomen of both sexes not constricted at segment 3.* (3) Spurs of segment 2 smaller, not very conspicuous, *angulated.* (4) Hindwings only moderately broad. (5) *Anal margin of hindwing of ♂ scarcely angulated at all;* the outer side of the anal triangle scarcely, if at all, thicker than the rest of the postcostal margin, and *curving insensibly round to join it at the anal "angle."* (6) *Anal triangle long and narrow, four-celled.* (7) Triangle of hindwing somewhat shorter and broader than that of the forewing, both four-celled. (8) Nodal sector takes only a slight and gentle curve. (9) Arculus scarcely 1 mm. from inner angle of triangle; *no* hypertrigonal cross-vein interposing.

The following may be indicated as less important, or subordinate, differences :—

GYNACANTHA (s.str.).—(10) Space between the fork of the subnodal sector and the supporting sector beneath it 5 or more cells broad. (11) 4-6 hypertrigonals in hindwing. (12) Between the short sector and the auxiliary sector lying below it, at its broadest point, 4-5 cells. (13) Superior appendages of ♂ very long (about 7 mm.), slender, narrow, and leaf-like. (14) Appendages of ♀ very long and exceedingly fragile. (15) Pterostigma 3·5-4 mm.

AUSTROGYNACANTHA.—(10) Space between the fork of the subnodal sector and the supporting sector beneath it 3 cells broad. (11) 2-3 hypertrigonals in hindwing. (12) Between the short sector and the auxiliary sector lying below it, at its broadest point, 3-4 cells. (13) Superior appendages of ♂ strong and fairly thick, not so long (5 mm.), narrow, sublanceolate. (14) Appendages of ♀ not so long, similar in form, and fragile. (15) Pterostigma 3 mm.

Of these differences, I consider Nos. 2, 5, and 6 of primary importance, and sufficient in themselves to place *Austrogynacantha* absolutely apart from *Gynacantha* (s.str.). The form of the abdomen may be seen in the Plate (fig.1); the remarkable formation of the anal triangle of the male, giving it practically a *rounded* hindwing, in fig.7; while that of *G. Rosenberghi* is shown in fig.6. The difference in the curvature of the nodal sector may be studied in figs.8 and 9.

The differences 10-12 may be directly attributed to the difference in size between the insects; while differences in the appendages and pterostigma cannot be pressed, for we find an amazing amount of variation in these respects in the *Aeschnidæ*. For instance, the species of the genus *Austroaeschna* show remarkable variety in the size and shape of the appendages of both sexes; while actually in the *individual* specimens of *A. unicornis* Selys, the pterostigma shows a considerable variation in length.

It is now necessary to indicate the differences between *Karschia* Förster, and *Austrogynacantha* Tillyard. This can only be done by a comparison of the females, the males of *Karschia* being still unknown. Furthermore, the position of *Karschia* in any classification of the *Aeschnidæ*, as well as its exact relation to *Gynacantha* (s.str.) cannot be accurately determined until the males are forthcoming.

Karschia Förster (*K. cornuta*♀ Foërster).—(1) Upper edge of front interrupted in the middle, more or less projecting in an angle. (2) Eyes strongly arched above, not depressed. (3) Spikes of the terminal fork of the tongue-shaped abdominal appendage on seg. 10 only half as long as the tongue. (4) Between nodal and principal sectors, near end of wing, only 5 rows of cells at the most. (5) 3-4 hypertrigonals in hindwing.

Austrogynacantha Tillyard (*G. heterogena* ♀).—(1) Upper edge of front *not* interrupted in the middle, straight or very slightly curved as in *Gynacantha* (s.str.). (2) Eyes weakly arched above, as in *Gynacantha* (s.str.). (3) Spikes of the terminal fork of the tongue-shaped abdominal appendage on seg. 10 almost as

ong as the tongue (Plate v. figs.4, 5). (4) 6-7 rows of very small cells. (5) 2-3 hypertrigonals in hindwing.

Karschia and *Austrogynacantha* apparently agree in the shape of the abdomen at segment 3, and also in the curvature of the nodal sector under the pterostigma.

Austrogynacantha and *Gynacantha* (s.str.) agree in the shape of the front and eyes, and practically also in the form of the membranule, which, though small in both, can scarcely merit the summary dismissal implied in the "presque nil" of Rambur (Plate v. figs.6, 7).

The following key will now serve to distinguish the new genus and to show its correct position in a classification of the Australian genera of the subfamily *Aeschninæ*.

	Hindwing of ♂ *without* an anal triangle (*i.e.*, postcostal margin *quite rounded*)	*1.*
	Hindwing of ♂ *with* an anal triangle (*i.e.*, postcostal margin *more or less angulated*)	*2.*
1	Inferior appendage of ♂ truncated	*Anax.*
	,, ,, ,, triangular	*Hemianax.*
2	Subcostal vein prolonged beyond nodus	*Telephlebia.*
	,, ,, *not* prolonged beyond nodus	*3.*
3	Basilar space reticulated	*Caliaeschna.*
	,, ,, free	*4.*
4	Subnodal sector *not* bifurcated	(absent from Australia)
	,, ,, bifurcated	*5.*
5	One row of cellules under fork	*Austroaeschna.*
	3-7 rows ,, ,, ,,	*6.*
6	Seg.10 of ♀ rounded below, carrying small spines	*Aeschna.*
	,, ,, prolonged below into a tongue armed with two distinct prongs	*7.*
7	Anal triangle of ♂ *fairly broad, 3-celled;* postcostal margin *strongly angulated*	*Gynacantha.*
	Anal triangle of ♂ *very narrow and long, 4-celled;* postcostal margin scarcely angulated at all	*Austrogynacantha.*

AUSTROGYNACANTHA HETEROGENA.

Gynacantha heterogena Selys MSS. (♀).

♂. Total length 59-60 mm.; abdomen 46 mm.; fore and hindwings 37-38 mm. Wings: *costa* brown, *subcosta* and *nodus*

pale brown, rest of neuration dark brown to black; *pterostigma* 3 mm., dark brown; *membranule*, fore very small, white; hind 1·5 mm., very narrow, white. *Nodal Indicator* $\begin{vmatrix} 15\text{-}18 & 10\text{-}13 \\ 11\text{-}14 & 10\text{-}13 \end{vmatrix}$. Head: *eyes* dark brown, very contiguous; *occipital triangle* very small, yellow; *vertex* very small, forming a yellow crescent-shaped tubercle. *Front* hairy, dull yellowish-brown above, upper edge marked with an indistinct dark brown ray gradually merging into the ground-colour; *face* olive-green, yellowish on sides; *clypeus* hairy, greenish-yellow; *labrum* dull greenish-yellow, an indistinct narrow brown line in suture next clypeus; *labium* and *genæ* dull yellowish, mouth edged with dark brown. Thorax: *prothorax* very small, brown. *Meso-* and *metathorax* rather short and thick, dark chocolate-brown above, dorsal ridge yellow, elevated near its centre into a sharp spine; on either side a beautiful slanting lemon-yellow antehumeral ray, rather short, and tapering to a point outwards in front. Sides of thorax greenish-yellow, more or less shaded with brownish-olive. Wing-joins and notum pale brown, profusely spotted with yellow. *Legs* very dark brown, underside of profemora pale yellowish, tibiæ distinctly ciliated. Abdomen: 1 wide, 2 slightly narrowing, 3 *not* constricted, 3-10 almost cylindrical, if anything 7-9 slightly wider than the rest, 2-7 with supplementary transverse carinæ. Colour: 1-2 dark brown, rest black, marked with pale lemon-yellow (greenish-yellow in mature specimens) as follows:—1, base yellow, a short dorsal mark and two small anal spots, sides also yellow—2, a distinct longitudinal dorsal ray, constricted in the middle by the supplementary carina, which divides the segment slantingly; a pair of indistinct central spots, very small, bordering the carina above and inclined to the dorsal ray, a pair of small anal spots; sides yellow, sutures with transverse brown rays, a brown line along the central carina; spurs very small, angulated, lemon-yellow; genital appendages not prominent—3, a fine dorsal line slightly thickened basally and broken by the carina; a pair of small central spots just below the carina and very close together; a pair of larger anal spots, wide apart; sides yellowish, except sutures and carina,

which are brown—4-7, a fine dorsal line, a pair of small round central spots close together, a pair of longitudinal spots wider apart, very little yellow on sides—8, a touch of yellow at base, a pair of spots one-third from base, a pair of large anal spots, wider apart—9, a pair of very small spots at base; a pair of anal spots wide apart—10, a pair of anal spots. Appendages: *superior* long and slender, 5 mm., narrow sublanceolate, black; projecting slightly below inwards just before half-way so as to form a very obtuse ledge, carrying a series of longish hairs on inner margin. *Inferior* nearly straight, slightly upcurved, hollow above, narrow subtriangular, 2 mm. (Plate v. figs. 2 and 3—the hairs are not quite as dense as shown).

♀. Very similar to ♂ but somewhat larger. Total length 60-65 mm.; abdomen 48-50 mm.; fore- and hindwings 39-41 mm.; pterostigma paler. Abdomen slightly thicker than in ♂, marked as in ♂, but the longitudinal dorsal ray more conspicuous, wider on first half of seg. 2, and on 3-7 slightly enlarged basally into a small triangular area; 9 somewhat larger than 8, 4 mm. long; 10 very short and narrow. Ovipositor with a very long and narrow spike, dark brown, reaching to below the end of 10 (*not* shown in the Plate); anal end of 9 carrying below two small 2-jointed filaments; 10 projecting below into a conspicuous tongue furnished with two prongs or forks curving downwards, their length being about equal to the distance which the tongue itself projects beyond the base of the rounded end of 10; this rounded end forming a pale downy tubercle placed above the tongue. Appendages very fragile [nearly always missing], 3 mm., dark brown, slender, leaf-like, narrow lanceolate, with hairs on inner margin. (Plate v. figs. 4, 5).

Hab.—Northern and Central Queensland: Rockhampton; Cooktown (February).

Types: The male is in my collection, the female in Coll. de Selys.

EXPLANATION OF PLATE V.

Fig. 1.—*Austrogynacantha heterogena* ♂, nat. size.
Fig. 2. ,, ,, ,, appendages seen from above.
Fig. 3. ,, ,, ,, ,, seen sideways.
Fig. 4. ,, ,, ♀, ,, seen from above.
Fig. 5. ,, ,, ,, ,, seen sideways.
Fig. 6.—*Gynacantha Rosenberghi* Selys ♂; anal triangle of hindwing.
Fig. 7.—*Austrogynacantha heterogena* ♂; venation of basal portion of hindwing.
Fig. 8.—*Gynacantha Rosenberghi* Selys; portion of forewing, showing curvature of nodal sector.
Fig. 9.—*Austrogynacantha heterogena*; portion of forewing, showing curvature of nodal sector.